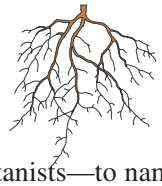
A Faster Way To Clean Roots



Agronomists, plant pathologists, and botanists—to name a few—are interested in the effects of soil and crop management practices on crop root systems. But before they can begin their studies, scientists usually have to spend time and energy cleaning soil off the roots. A new invention by the Agricultural Research Service (ARS) may help with that.

Soil scientist Joseph G. Benjamin, of ARS's Central Great Plains Research Station in Akron, Colorado, has created a root washer with a rotary design to automate and speed up the process. Other devices require more attention from the operator. The new device can clean up to 24 samples at a time, more than previous washers.

The washing cycle starts when a technician places a sample of soil and roots in the machine's chambers. As the sample rotates within the machine, it is dipped into and sprayed with water to remove the soil. Mud exits from the back of the machine. The cycle takes about 90 minutes, and the roots, which are not damaged by the machine, are then ready for study.

The new device can clean up to 24 root samples at a time.

"The root washer works well to easily and quickly separate plant roots and other organic materials from the soil," Benjamin says. He also points out that his device can wash larger samples than other washers can.

Once the roots are clean, a flatbed scanner is then used to digitize images of them for scientists to analyze with computer software. Through mathematical equations, Benjamin is able to determine the surface area of the roots contained in the sample. As Benjamin points out, "The human eye is still the best discriminator at determining what materials are roots and what are not."

Benjamin's root washer is an enlarged version of a weed-seed washer invented by weed scientist Lori J. Wiles and others in ARS' s Water Management Research Unit, at Fort Collins, Colorado. Before her invention, there was nothing available commercially to quickly wash soil from seeds.—By **David Elstein,** ARS.

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Where's the Meat?

Animal scientist Alva Mitchell, of the Growth Biology Laboratory at the ARS Beltsville (Maryland) Agricultural Research Center, used dual x-ray absorptiometry (DXA) to measure pork carcass composition. This method is noninvasive and requires little user input in terms of manipulation and data processing. "The technology is based on using x-rays of differing energy levels to scan for soft tissue of differing densities," says Mitchell.

The technology was used in the lab to measure pork carcass composition by performing a total scan of pork carcass halves. Information from selected cross-sections of the image was highly predictive of the composition of the entire carcass.

Hog production has undergone significant changes over the past hundred years. In the first half of the 20th century, market hogs were bred for lard, which was used as a resource during both World Wars. About midway through the century, consumers began looking for leaner meat—highly nutritious but with less fat and calories. The pork industry responded by breeding for leanness. However, it was hard to know just what the lean-to-fat ratio was throughout the carcass without cutting it into its various parts. "Dual x-ray absorptiometry would allow packers to know just what they are paying for: the true value of the meat and not a large amount of fat that gets cut off before shipping," says Mitchell.

Over the years, instrumentation has allowed the fat-to-lean ratio to be determined with an acceptable degree of accuracy. Now, rapid, accurate methods are needed to provide information regarding the fat and lean content during the on-line processing of pork carcasses.

The DXA instruments Mitchell used scanned cross-sections of the carcass at a speed of 7.68 centimeters per second, using pencil-beam x-ray technology. This speed compares to the processing chain speed of 16.6 centimeters per second. Newer DXA instruments use a wide-angle or fan-beam technology that will scan wider sections, increasing scanning speed and making the technology potentially adaptable to on-line evaluation of pork carcasses. Mitchell's next step is to find a commercial packing plant to test the technology, which would require adapting it to the processing environment.—By **Sharon Durham,** ARS.

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